

**WHAT IS CLAIMED IS:**

1. A process for separating aqueous sodium bicarbonate brine from soap oil in the recovery process of a pulp mill, comprising:

neutralizing a crude tall oil soap by forming a mixture comprising crude tall oil soap, water and carbon dioxide; and

separating aqueous sodium bicarbonate brine and soap oil obtained from said neutralization,

wherein said mixture comprises a water solution having an increased density.

2. A process according to claim 1 wherein neutralizing said crude tall oil soap comprises diluting said crude tall oil soap with said water solution having an increased density and then mixing the diluted crude tall oil soap with carbon dioxide.

3. A process according to claim 1 further comprising forming said water solution having an increased density by mixing ash or dust from a recovery process with water.

4. A process according to claim 3, wherein said ash or dust from said recovery process is precipitator ash.

5. A process according to claim 3 wherein said ash or dust comprises one or more sodium or potassium salts of a sulfate, carbonate or chloride, said one or more salts being dissolved in water to form said water solution having an increased density.

6. A process according to claim 1 wherein said water solution having an increased density has a density from about 1000 kg/m<sup>3</sup> to about 1500 kg/m<sup>3</sup>.

7. A process according to claim 6, wherein said water solution having an increased density has a density from about 1050 kg/m<sup>3</sup> to about 1300 kg/m<sup>3</sup>.

8. A process according to claim 6, wherein said water solution having an increased density has a density from about 1100 kg/m<sup>3</sup> to about 1200 kg/m<sup>3</sup>.

9. A process according to claim 3 wherein forming said water solution having increased density comprises mixing said ash or dust with water recirculated within said recovery process.

10. A process according to claim 9 wherein said ash or dust is mixed with water containing sulfate brine solution.

11. A process according to claim 1 further comprising treating said soap oil with sulfuric acid.

12. A process according to claim 11 wherein a water solution having an increased density is added to said sulphuric acid.

13. A process according to claim 1 wherein after said neutralization and prior to said separation of said sodium bicarbonate brine and said soap oil, a change in pH of said mixture is less than 0.2. preferably less than 0.1, and most preferably there is no change in pH.

14. A process according to claim 13 wherein after said neutralization and prior to said separation, the change in pH of said mixture is less than 0.1.

15. A process according to claim 13 wherein the pH remains essentially unchanged after said neutralization and prior to said separation.

16. A process for separating aqueous sulfate brine from crude tall oil in a recovery process of a pulp mill, comprising:

acidulating a soap oil by forming a mixture comprising soap oil, water and sulphuric acid; and

separating aqueous sulfate brine and crude tall oil obtained from said acidulation step,

wherein said mixture comprises a water solution having an increased density.

17. A process according to claim 16 further comprising forming said water solution having an increased density by mixing ash or dust from a recovery process with water.

18. A process according to claim 17, wherein said ash or dust from said recovery process is precipitator ash.

19. A process according to claim 17 wherein said ash or dust comprises one or more sodium or potassium salts of a sulfate, carbonate or chloride, said one or more salts being dissolved in water to form said water solution having an increased density.